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THE INFLUENCE OF MAGNESIUM SULPHATE ON THE MOTOR CELLS OF THE CEREBRAL CORTEX.

BY H. F. HYNDMAN AND W. E. MICHENER.

(Contribution from the Physiological Laboratory of the University of Kansas.)

THE experiments of which the results are here briefly recorded were undertaken for the purpose of ascertaining whether magnesium sulphate paralyzed the motor cells of the cerebral cortex. It was found that 1.5 grams of magnesium sulphate per kilo, when injected in rabbits subcutaneously, produced anæsthesia in about fifty minutes that lasted two hours.

Rabbits were employed in all of the tests and three series of experiments were carried out.

In the first set ether was given, and when anæsthesia had developed the motor areas were exposed, and a definite, well-defined small area, which when stimulated with insulated platinum electrodes with a determined minimal strength of induced current, caused the hind leg of the side opposite to the one stimulated to give a definite contraction. The cortex was then carefully removed and again the minimal strength of current determined that would produce the same extent of contraction as before in the same leg. The animal was then allowed to come from under the influence of ether, and then an anæsthetic dose of magnesium sulphate was injected. The same area on the opposite side was now stimulated with a determined minimal strength of current that would produce the same extent of contraction as was secured with ether. The cortex was then removed and again the minimal strength of current determined.

The experiment was also modified in that the minimal

strength of current for contraction was determined after cortex stimulation, and then, when the animal recovered from the ether effect, magnesium sulphate anæsthesia was secured. Again the cortex was stimulated with a minimal strength of induced current.

The results of this set of experiments were that it required exactly the same strength of current to produce the same extent of contractions, both with the cortex intact as well as when the motor cells were removed and the fibers directly stimulated under ether as under magnesium sulphate anæsthesia. In each case the strength of current required for the same contraction was greater when the motor fibers were directly stimulated after the motor cells were removed than when the contractions were secured indirectly by direct stimulation of the motor cells.

The second set of experiments differed from the first set in that the same procedure was carried out under magnesium sulphate anæsthesia alone.

The third set of experiments consisted in determining the strength of current when applied to the central ends of the eighth and seventh cervical dorsal spinal nerves under ether and magnesium sulphate anæsthesia that would reflexly cause contraction of certain muscles of the mouth.

A comparison of all the experiments showed that the same minimal strength of current was required to produce the same extent of contraction under ether as under magnesium sulphate anæsthesia, whether applied directly to the motor fibers, indirectly to the fibers through the motor cortical cells, or when applied to afferent fibers that secured a reflex response; and that a greater strength of current was required when applied directly to the motor fibers than when the impulses reached these through stimulation of the motor cortical cells.

We conclude, therefore, that magnesium sulphate anæsthesia does not paralyze the motor cells of the cerebral cortex in the rabbit.

We take this opportunity to thank Doctor Hyde, under whose supervision these experiments were conducted, for her many kind suggestions.